

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Footwear

I, HERBERT LUDWIG, of 112 Demastrasse, Achim bei Bremen, Germany, a German citizen, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to processes and apparatus for vulcanising rubber soles on to shoe uppers provided with welts; the welts may be formed as so-called ornamental welts, so that the impression of a welted shoe is created.

The vulcanising of rubber soles on to shoe uppers, in particular smooth or greased leather uppers, causes considerable difficulties, since vulcanisation on to the smooth leather cannot be performed satisfactorily and roughening up is very troublesome.

Hitherto, therefore, rubber soles have usually been cemented on to smooth uppers, but this does not always ensure a satisfactory permanent attachment and cemented soles frequently become detached from the uppers in use.

There have, however, been various proposals for making footwear with soles of rubber vulcanised to the uppers.

One such proposal is for a method of manufacture of footwear with soles containing rubber moulded and vulcanised to an upper consisting in providing the upper with a welt, or with its lower margin extended to permit the extension to be turned outwardly in simulation of a welt, placing said upper upon the last of a vulcanisation mould, forming a re-entrant crease between the upper and the welt or marginal extension, pressing said crease into desired final position so tightening and stretching the upper on the mould last, and finally moulding and vulcanising a rubber mix, placed in the mould, to the crease parts, while holding said upper in position.

Another proposal is for a method of making an article of footwear having a rubber sole and an upper of other material, characterised in that the lower edge of the upper is turned over towards the exterior, united in this form,

by stitching or sticking, to the inner or primary sole, the edge thus formed on the article of footwear being surrounded by an envelope of rubber which constitutes a homogeneous mass with the sole and which is moulded during vulcanisation in suitable moulds.

An object of the present invention is to provide an improved and economical process for vulcanising rubber soles on to shoe uppers provided with welts.

According to the invention there is employed a process for vulcanising rubber soles on to shoe uppers provided with welts, characterised in that the edge of the upper provided with the welt projects freely beyond the bottom of the last and that whilst the projecting flange of the moulding frame encloses the upper above the welt with some clearance, the last is moved away from the moulding frame so that the welt abuts against the moulding frame and the upper is thereby tensioned and stretched, i.e. lasted or shaped over the last, and thereafter the vulcanising of the rubber sole is effected, the welt abutting and automatically sealing against the projecting flange of the moulding frame and/or against the last under the pressure of the rubber compound.

It will be realised that the invention thus offers a substantial advantage in that the lasting of the upper is effected on the same apparatus as the vulcanising of the sole to the upper, thereby reducing the number of separate manufacturing operations and so reducing the cost of production.

A further feature of the invention is the provision of an apparatus for effecting the process described, characterised in that the inner peripheral surface of the projecting flange of the moulding frame is spaced from the upper on the last just above the welt, means being provided for raising the last after the closing of the moulding frame, i.e. for moving the last away from the moulding frame.

By the present invention it is possible to obtain a reliable water-proof connection between the sole and the upper, together with an attractive welted appearance.

Hitherto for really satisfactory results it has been necessary to make double hand-sewn welted shoes, which, of course, are the most costly to manufacture. Welted shoes sewn by machine are not usually satisfactorily water-proof, in contrast to those produced when the considerably cheaper manufacturing process according to the invention is employed.

The invention also facilitates the production of a rigid welt having the desired shape, it being possible at the same time for the vulcanisation to be so carried out without injuring or impairing the upper that no losses of rubber whatsoever can occur during the pressing operation.

Before closing the moulding frame of the press when the vulcanising operation is performed, the last is moved into a position lower than the operating position, and the last is moved to the higher or operating position only after the moulding frame has been closed. In this way, easy closing of the parts of the moulding frame is made possible without damage to the upper welt and, what is of decisive importance, the upper is lasted on the hot aluminium last. It has hitherto always been the practice to regard leather shoes having a sewn-in insole made by the slip-lasting process as low-grade, for the reason that they were not properly lasted. In order to eliminate this drawback, the practice was adopted of lasting the uppers on a last outside the vulcanising press. This of course, causes additional costs since it is associated with an additional operation.

A further advantage is that an ornamental welt can be provided and given any desired shape, according to the fashion at any given time, without altering the sole moulding frame. In particular, however, it becomes possible, owing to the subsequent application of the ornamental welt, to cover any pressure or compression marks which may have been caused by the hot moulding frame during the vulcanising process, so that the shoe, which might otherwise show such pressure marks on the upper and the welt, is now given a more attractive and pleasing appearance by the subsequently applied ornamental welt. In particular, the result is achieved that, because the ornamental welt has been applied subsequently that is after the sole has been vulcanised on the upper, the layman is unable to determine whether the sole has been vulcanised or cemented on at all or has been attached in some other way. Alternatively the moulding frame may be provided with a bearing surface such that the welt itself is pressed into the desired shape under pressure and heat during the vulcanising operation.

Further and optional features of the invention appear from the following description and claims.

In the accompanying drawings the invention is illustrated by way of example.

Figures 1, 4 and 6 to 19 showing details of construction of shoes in sectional elevation, and

Figures 2, 3 and 5 being sectional views showing stages in the process of manufacture.

In Figure 1, part of an article of footwear is shown in section and in this case the upper 10 has its edge 11 projecting freely beyond the bottom of the last 12. The upper is provided on the outside with a welt 13 formed as an ornamental welt, which is sewn on to the edge 11 of the upper by means of a seam 14 passing through the downwardly projecting arm 15 of the said welt. The outwardly directed free arm 16 of the welt 13 may be provided with an ornamental seam 17, which can hold a reinforcing strip 18 at the same time.

The welt 13, which consists for example of leather, is so arranged that its rough or flesh side faces in the direction of the sole. The rubber sole 19 to be vulcanised on therefore completely covers the edge 11 of the upper which likewise has its rough side facing the sole 19, so that the edge 11 of the upper is firmly vulcanised into and anchored in the sole 19 together with the downwardly directed arm 15 of the welt 13 connected to it. At the same time, a satisfactory firm connection of the rubber sole 19 to the underside of the reinforcing strip 18 is also made.

The sole 19 is vulcanised on upwardly to such a point, at least at the inside of the edge 11 of the upper, that the seam 14 is also vulcanised in.

Figures 2 and 3 show in section a press apparatus consisting of a table 20, a guide frame 21, a moulding frame 22 and a sole ram 24. The upper 10 and the welt 13 have been pulled over the last 12. The insertion of the last 12 with the upper 10 into the mould is carried out by first bringing the last 12 into a lower position than the operating position, as is shown in Figure 2. After the moulding frame 22 has been closed, for example by means of a toggle lever closing device 26, the last 12 is brought into the higher operating position (Figure 3), so that the free arm of the welt 13 is firmly drawn from below against the projecting flange of the vulcanising mould which faces the last. In this way, lasting of the upper 10 is effected, the last 12 and the upper 10 and the welt 13 being brought into their correct positions.

The press mould is thus completely sealed off from the outside, although the moulding frame 22 encloses the upper 10 with a clearance 28, so that damage to the upper is excluded. The sole ram 24 is now raised and the necessary vulcanising pressure is thereby produced. The rubber compound 19 begins to flow under the effect of heat and pressure and in turn forces the welt arm 16 firmly against the projecting flange of the vulcanising mould which faces the last, so that the seal becomes complete.

Figure 4 shows diagrammatically an article of footwear in which a welt 13 is first attached by its downwardly directed arm 15 to the bottom edge 11 of the upper 10 by means of the seam 14. The rubber sole 19 is then vul-

5 canised on to this welt 13 and the downwardly projecting edge 11 of the upper using the last 12.

10 The ornamental welt 30 is cemented on subsequently after the sole has been vulcanised on and after the shoe comes out of the vulcanising press. This ornamental welt 30 may have any desired ornaments (grooves, ribs, beads, etc.) without specially made moulding frames 22 being needed for the purpose. The orna-

15 mental welt may be provided with these ornaments from the start, or it may also be provided with the ornaments subsequently, after it has been cemented on, or while it is being cemented on in a press.

Fig. 5 shows a shoe partly in section, with the associated vulcanising arrangement. The welt 13 is sewn on to the upper 10 by the seam 14. This welt 13 is formed as a beaded welt, the bead of which is held by the seam 31. A corresponding recess 27 is provided in the moulding frame 22, so that after the moulding frame 22 has been closed, for example by means of the toggle lever closing device 26, and after the last has been brought into the higher operating position, the beaded welt is disposed in the corresponding recess 27 in the moulding frame 22 and is once more shaped by the latter.

35 Further embodiments of the welt 13 sewn on to the edge 11 of the upper 10 are shown in Figs. 6 to 18. In all these embodiments, the vulcanisation of the sole on to the upper provided with a welt takes place without any insole being sewn in.

40 Fig. 6 shows an upper 10 which is vulcanised in by its bottom edge 11 with the aid of the last 12. The welt 13 is made in two parts and has an outwardly projecting arm 16 and an inwardly directed arm 32. Both arms are connected to the upper 10 by means of a seam 14. A reinforcing strip 18 can be placed against the arm 16 from below, it being possible for the said strip to be held by means of cementing or a seam 17, which simultaneously serves as an ornamental seam.

50 As the upper is at first open at the bottom and the welt arms 16 and 32 can easily be turned up during manufacture, the attachment thereof to the upper 10 by means of the seam 14 creates no difficulty.

60 Fig. 6 shows clearly that even in the case of the manufacture of an article of footwear without any insole the rubber compound 19 cannot flow up between the upper 10 and the last 12 during the vulcanising process, since the arm 32 abuts firmly against the last 12 during the said process.

65 Fig. 7 shows another embodiment. In this case, the arm 32 is not secured directly to the

upper 10, but is secured to the outwardly projecting arm 16 by means of the seam 17. The welt 13 is held on the upper 10 in known manner by means of the seam 14.

70 Here, too, although this shoe is provided with an insole 34, manufacture is very simple, since when the welt 13 is sewn on to the upper 10 by means of the seam 14 the upper is open at the bottom and the arm 32, which has already been connected beforehand to the outwardly projecting arm 16 of the welt 13 by means of the seam 17 or by cementing, can be swung away downwardly, so that it does not cause any interference when the seam 14 is being made. To this end, when the arm 32 is cemented to the arm 16, the arms are connected only about as far as the seam 17, reckoning from the outside. The insole 34 is merely inserted between the arm 32 and the last 12 and is then firmly vulcanised on to the rubber sole 19 together with the arm 32.

85 It is, of course, equally possible to manufacture an article of footwear according to Fig. 6 also with an insole. Likewise, all the embodiments shown in Figs. 6 to 18 can be made in the same way with or without an insole. In these Figures, the insole has been omitted for simplicity and clarity, just as has the representation of the last 12.

90 Fig. 8 shows a further embodiment in accordance with Fig. 7, but in this case the arm 32 is merely arranged between the arm 16 of the welt 13 and a reinforcing strip 18.

95 Fig. 9 shows how the arm 32, which is arranged solely on the arm 16, can serve at the same time as a welt-reinforcing strip.

100 Figures 7 to 9 show that the side or arm 35 by which the welt is attached to the upper may point upwards, while in Fig. 6 there is shown a welt 13 having a downwardly pointing attaching arm.

105 Fig. 10 shows a complete different embodiment. Here, the two arms 16 and 32 of the welt 13 consists of a single piece. A lip 36 obtained by channelling can be used for attaching the welt to the upper 10.

110 Moreover, Fig. 10 shows, in contrast to Figs. 7 to 9, that the attaching arm, which here takes the form of the lip 36 of the welt 13 obtained by channelling, may equally well be arranged within the upper 10, whereas in the case of Figures 7 to 9, for example, it is attached to the outside of the upper 10.

115 Furthermore, Fig. 10 shows how the arm 32 is expediently provided with notches 37, for example of triangular shape, in order to obviate buckling or bulging in particular at the rounded portions of the heel and toe.

120 Fig. 11 shows an embodiment in which the welt 13 embraces the bottom edge 11 of the upper in the form of a U with the two arms 16 and 32, which are in one piece. The advantage of this embodiment consists in the particularly simple way in which it is made and also in that the connecting seam 14 is com-

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pletely vulcanised into the rubber sole 19.

Fig. 12 shows an embodiment corresponding to Fig. 11, but in which it is shown that the arm 16 and/or the arm 32 can be provided in addition with a reinforcing strip 18 (see also Figs. 1 to 6).

Fig. 13 shows a particularly favourable embodiment. In this case, in fact, the arms 16 and 32 of the welt 13 are likewise formed of one piece, but they are pre-formed ready for use in that, for example, they are directly made in the required shape entirely of rubber. This has the advantage that the sewing on to the edge of the upper is considerably facilitated and becomes considerably more accurate and moreover a good connection is ensured. A welt 13 preformed in this way and its arms 16 and 32 could consist not only of rubber, but also of leather, synthetic resins or the like, if necessary in combination with textiles. Thus, the top or the underside of the welt and its arms 16 and 32 could be covered with textiles or be provided with other materials which unite easily with rubber, for example chrome leather and unvulcanised or prevulcanised rubber. In this way, the welt becomes considerably stronger. Covering of the welt and/or arms thereof could also readily be carried out in the case of all the embodiments previously described. The covering may be single or double.

Figs. 14 to 16 show an embodiment in which the welt 13 and its side pieces 16 and 32 are formed by a thin strip 38 made of textile, leather, synthetic resin or the like embracing the edge of the upper in the shape of a U and connecting the said side pieces to one another, the welt being held to the upper 10 by means of a seam 14.

Fig. 14 shows first of all the connection of the two arms on side pieces. Fig. 15 then shows the insertion of the upper 10 and the connection by means of the seam 14 with the arms 16 and 32 of the welt turned upwards. In this way, very simple sewing on is ensured.

Fig. 16 then shows the final form.

Fig. 17 shows an embodiment somewhat different to that shown in Fig. 16. Here, the arms or side pieces 16 and 32 of the welt are each enclosed all round by the thin connecting strip 38 which embraces the edge 11 of the upper in the shape of a U and to which they are held by means of the seam 14.

The embodiments shown in Figs. 14 to 17 provide particularly cheap footwear. In these embodiments, the two side pieces 16 and 32 consists only of two wedges or other strips formed in any desired manner, which are connected by textiles or other readily flexible materials. Moreover, this embodiment ensures that manufacture is very simple, because the two side pieces of the welt can be turned upwards for inserting the connecting seam 14.

In all the embodiments, the arm or side piece 32 can taper inwardly, so as thus to

avoid the need for any considerable modification of the last 12.

Fig. 18 shows that the side piece 16 and/or the side piece 32 may have dovetail-shaped recesses 39 on their undersides for the purpose of better connection with the rubber sole 19. These recesses may, of course, be provided in all the embodiments. They produce practically speaking an unbreakable connection of the sole with the side pieces of the welt.

Fig. 19 shows another form of the recesses in the form of holes 40 which are simpler to produce than the dovetail-shaped ones and by which the side piece 16 and/or the side piece 32 are perforated. The rubber flows up into the holes 40 and anchors the sole 19 additionally. It would also be conceivable to form these holes to be conical so that the anchoring action is further increased.

All these embodiments have the advantage that they are economical because the lasting of the uppers is carried out in one operation together with the vulcanising on of the sole and, moreover, substantial quantities of upper material are saved, as the lasting turn-in, such as, for example, is required in MacKay-lasted shoes, is eliminated. Finally, all the embodiments have the advantage that, along with satisfactory manufacture of this footwear with vulcanised on rubber soles, the shoe can create the impression of a double- or treble-sewn shoe, as desired, by reason of the welt provided with a decorative welt.

What I claim is:—

1. A process for vulcanising rubber soles on to shoe uppers provided with welts, characterised in that the edge of the upper provided with the welt projects freely beyond the bottom of the last and that whilst the projecting flange of the moulding frame encloses the upper above the welt with some clearance, the last is moved away from the moulding frame so that the welt abuts against the moulding frame and the upper is thereby tensioned and stretched, i.e. lasted or shaped over the last, and thereafter the vulcanising of the rubber sole is effected, the welt abutting and automatically sealing against the projecting flange of the moulding frame and/or against the last under the pressure of the rubber compound.

2. Apparatus for effecting a process according to claim 1, characterised in that the inner peripheral surface of the projecting flange of the moulding frame is spaced from the upper on the last, just above the welt, means being provided for raising the last after the closing of the moulding frame, i.e. for moving the last away from the moulding frame.

3. Apparatus according to claim 2, characterised in that the projecting flange of the moulding frame is formed to fit the shape of the welt.

4. Apparatus according to claim 3, characterised in that the projecting flange of the

moulding frame is formed with a recess to fit a bead on the welt.

5 5. A process according to claim 1, characterised in that after the rubber sole has been vulcanised on, an ornamental welt is subsequently placed on and attached to a projecting arm of the welt, for example by cementing.

10 6. A process according to claim 1 or 5, characterised in that an arm of the welt projecting towards the inside of the upper is made to bear against the last in self-sealing fashion by the pressure of the rubber compound, and the rubber sole is also vulcanised on to the underside of this arm.

15 7. A process according to claims 1 and 6, characterised in that the inwardly projecting arm is bent at an angle and is attached to the inside of the upper by a downwardly directed attaching arm.

20 8. A process according to claims 1 and 6, characterised in that the arm directed into the interior of the upper is attached solely to the outwardly projecting arm of the welt.

25 9. A process according to claims 1, 6 and 8, characterised in that the inwardly directed arm is secured between the outwardly directed arm and a welt-reinforcing strip.

30 10. A process according to claims 1, 6 and 8, characterised in that the inwardly directed arm simultaneously serves as a welt-reinforcing strip.

35 11. A process according to claims 1 and 6, characterised in that the outwardly projecting arm of the welt and the inwardly directed arm of the welt consists of one piece.

40 12. A process according to claims 1, 6 and 11, characterised in that a lip formed by channeling serves for attaching the two welt arms formed of one piece to the upper.

13. A process according to claims 1, 6 and 11, characterised in that the arms of the welt consisting of one piece embrace the bottom edge of the upper in the shape of a U.

45 14. A process according to claims 1 and 6, characterised in that the outwardly projecting

arm and/or the inwardly directed arm of the welt are provided with a reinforcing strip.

15. A process according to claims 1, 6, 11 and 13, characterised in that the arms of the welt, which consist of one piece, are preformed ready for use.

16. A process according to claims 1 and 6, characterised in that the outwardly directed arm and the inwardly projecting arm are held to the edge of the upper by means of a thin strip of textile, leather, synthetic resin or the like embracing the edge of the upper in the shape of a U and interconnecting the said arms.

17. A process according to claim 16, characterised in that the welt arms are enclosed all round by the thin connecting strip.

18. A process according to any of claims 1, or 5 to 17, characterised in that the welt arms or the reinforcing strips are provided on the underside with recesses for the purpose of better connection with the rubber sole.

19. A process according to any of claims 1 or 5 to 18, characterised in that for the purpose of better anchoring of the rubber sole the reinforcing strip and/or the welt arm or arms are provided with holes which pass right through the reinforcing strip and/or the welt arms and an ornamental welt is cemented on after the vulcanising process.

20. A process for vulcanising rubber soles on to shoes substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

21. Apparatus for use in vulcanising rubber soles on to shoes, constructed and arranged substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

22. A shoe made by a process or with the use of apparatus according to any of the preceding claims.

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3 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

FIG. 1.

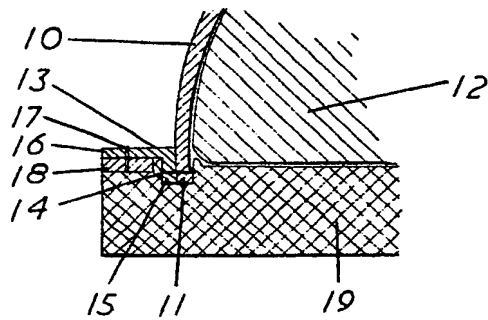


FIG. 2.

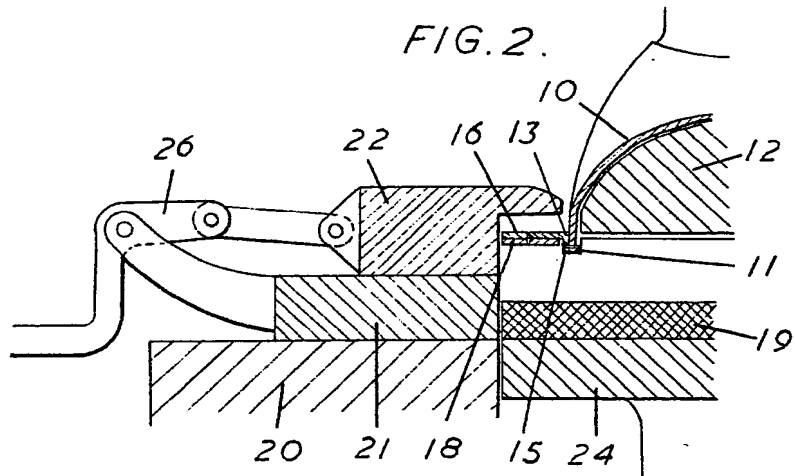


FIG. 3.

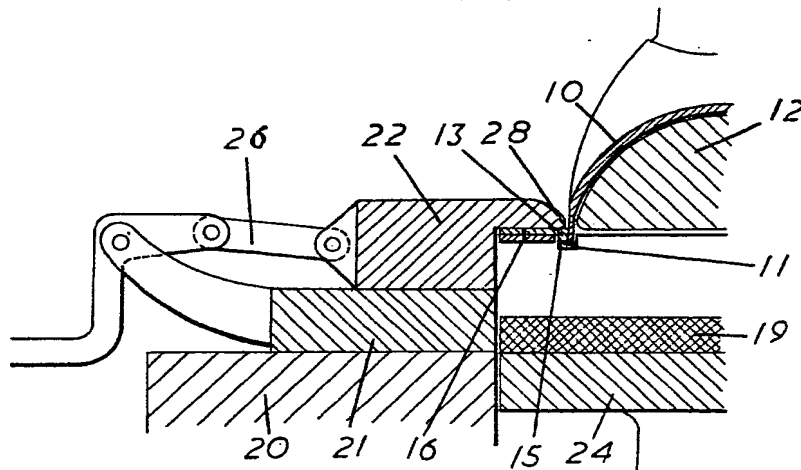


FIG. 4.

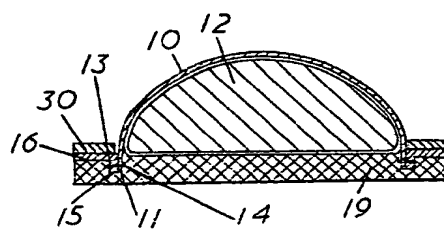
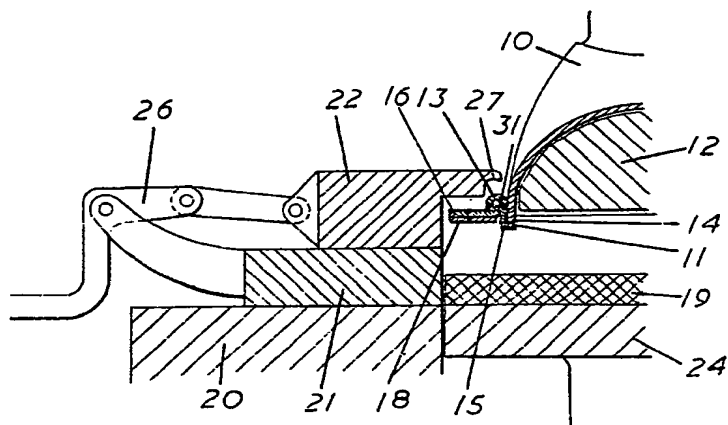


FIG. 5.



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3 SHEETS

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SHEETS 2 & 3

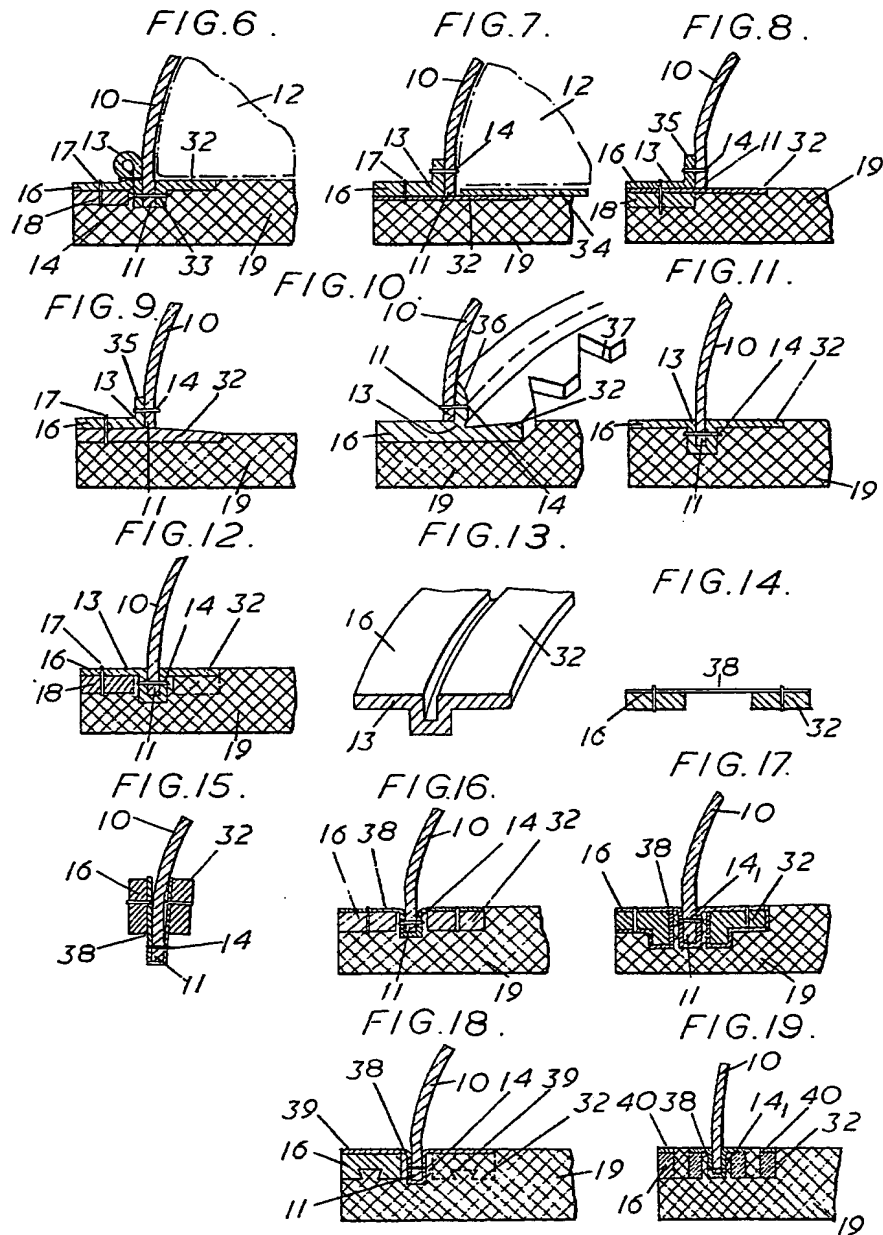


FIG. 4.

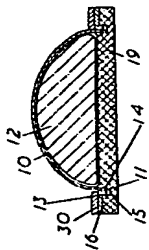
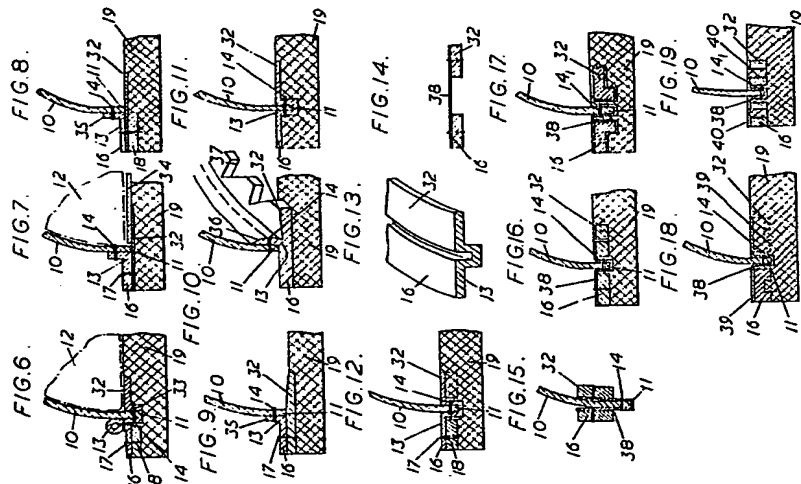
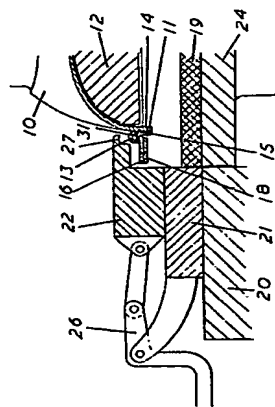


FIG. 5.



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